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ARBORETUM BULLETIN

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Concerning This Issue . . .

This issue of the Arboretum Bulletin is a celebration of spring, here at last! The American Camellia Society has given us permission to reprint an article by Joe Witt on the fine camellia collection in the Arboretum. Clayton Antieau gives us some insight into the Shakespearean world of gardening in his article "Gardens Rich in Gillyvors." The gillyvors are blooming in many of our gardens now (you must read the article to find out what a gillyvor is). Leslie Norton inspires us with her article "A New Beginning."

Daphne Lewis has written an introduction to bamboos which should dispell some of the common myths and misconceptions about these beautiful plants. Speaking of myths, Nan Ballard shares with us her amusing experiences with the elusive mountain beaver — if you are not from the Pacific Northwest you may be confusing these critters with snipe!

In this issue we begin a new series of articles entitled "In the Arboretum . . ." These articles will keep members informed on new projects, etc., that are going on in the Arboretum.

Nancy Pascoe

The ARBORETUM BULLETIN is published quarterly, as a bonus of membership, by the Arboretum Foundation, a non-profit organization to further the development of the Washington Park Arboretum. Information regarding membership in the Foundation may be obtained by writing to the Arboretum Foundation, University of Washington XD-10, Seattle, WA 98195 or by calling (206) 325-4510. Articles on botany and horticulturally-related subjects written by professional and amateur botanists, horticulturists, educators and gardeners are welcomed. No part of the BULLETIN may be reprinted without the authority of the Arboretum Foundation. Typesetting and lithography by Heath Printers.

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Arboretum Bulletin

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COVER
Dianthus neglectus. From
A Garden of Pinks, by L.H. Bailey

Camellia Collection at the Washington Park Arboretum

J.A. WITT

This article was originally published in the 1983 American Camellia Yearbook. We would like to thank the American Camellia Society for allowing us to reprint it.

The Washington Park Arboretum in Seattle is operated and managed by the Center for Urban Horticulture of the University of Washington. It occupies some 200 acres near the shores of Lake Washington and is owned by the City of Seattle whose Parks and Recreation Department has certain maintenance responsibilities. The University, through the Center, is charged with developing and caring for the woody plant collections growing there. There are at present approximately 5500 taxa of trees and shrubs in these collections, which are among the largest in the West. It is the most northerly of major botanical gardens and arboreta in the United States, situated at 47° 39′N, approximately the same latitude as the northern tip of Maine. There is, however, no similarity in climate between these two locations since Seattle climate is influenced by the flow of warm marine air from the Pacific Ocean some 90 miles to the west and by the immediate proximity of Puget Sound and Lake Washington. It is further protected by the Cascade Mountains to the east which form a barrier preventing the influx of continental weather from the northeast. These geographic factors give Seattle a mild and somewhat moist climate, with warmish winters and cool summers. The maximum temperatures occurring in the summer months rarely reach 90° F and then only for a few days at a time; the highest temperature recorded in the Arboretum was 100° F. Conversely, the winters are mild with maximum temperatures in the 40° F range and minimums above freezing. An occasional cold period may occur, however, and then the minimums will drop to the lower teens. The lowest reading recorded at the Arboretum was 8° F. These cold spells usually last less than a week. Precipitation, despite Seattle's reputation for rain, is only about 40 inches, most of which

Camellia japonica *'Coronation.'* *photo: courtesy of the Washington Park Arboretum*

occurs from October through April when over 80 percent falls. May through September is a dry season with July and August each averaging less than an inch of rain.

Snow is variable; in some years, there is none, in others there may be up to eight or ten inches, but rarely does it last for more than a week. When it does come, it is often heavy and wet.

With such a fine climate for growing plants of all types, Seattle and its surrounding suburbs have had a strong interest in ornamental horticulture for many years so it is perhaps surprising that it was not until the second decade of this century that any serious attempt to establish a botanical garden was begun. It was in 1934 that the University of Washington and the City of Seattle agreed to develop an arboretum in Washington Park, known as the University of Washington Arboretum. Until recently, the Arboretum has made a strong effort to grow a wide range of broad-leaved evergreens and now contains large collections of these plants which are eminently suited to the coastal Pacific Northwest climate. Among those genera which are well represented are *Rhododendron, Ilex, Cistus, Buxus,* and of course, *Camellia.*

The original master plan for the Arboretum, prepared by the Olmsted Brothers of Brookline, Massachusetts in 1936, placed the Theaceae near the top of a west facing slope, well furnished with native trees, primarily Douglas fir, western red cedar, western dogwood and bigleaf maple. Here a mildly acid, well drained, sandy loam of moderate fertility lays atop a dense till, the relic of an ice sheet which covered the area some 10,000 years ago.

This site was developed in 1945 and the first camellia plantings were made at that time. Old records show that 278 plants were set out in early April that year along with other plants of the Theaceae including *Franklinia alatamaha, Eurya* species, and *Stewartia* species. A wide range of material was used as companion plantings such as *Cornus kousa, Rhododendron schlippenbachii, Cercidiphyllum japonicum* and *Oxydendrum arboreum.*

The majority of camellias in this first group were those cultivars of *Camellia japonica* that had been tried and proven successful in Seattle. A sampling of these indicates what was popular thirty to forty years ago: 'Akebono', 'Debutante', 'Christmas Cheer', 'Cup of Beauty', 'Tricolor

Camellia japonica *'Auburn White.'* *photo: Joy Spurr*

Red', 'Tricolor', 'Ecstacy', 'Purity', 'Fred Sander', 'Te Deum', and 'Black Prince.' This first planting was followed in 1948 and 1949 by a new area a few yards south which shortly became *the* Camellia collection. This was a flat to gently sloping site with some mature Douglas firs and western red cedar amongst which were established one long border bed with four island beds. The sinuous border bed divided the camellias from Rhododendron Glen, the major rhododendron plantings in the Arboretum. Nearly 200 camellias were planted in March and April, 1949 with small additions made yearly, largely from plants either moved from the now overcrowded first planting or from plants purchased locally.

Disaster in the form of an unusually vicious cold front hit Seattle in November, 1955. It devastated many of our collections including the camellias; perhaps two-thirds were defoliated completely and at least half of these were removed. In total some 350 plants were eliminated. Most of these were cultivars of *C. japonica,* 145 taxa in all, but nearly all other species suffered equally. Indeed, all the *C. reticulata, C. oleifera,* and many *C. sasanqua* and *C.* X *williamsii* had to be removed. Hindsight would indicate we should have been more conservative in consigning freeze injured plants to the compost and chipper since perhaps some would have recovered. Truthfully, however, we were able to use this occasion to dispose of a number of overgrown and unlabelled plants at the time. It also gave us the opportunity to upgrade the collection and add a number of species and cultivars which were not included in early plantings. The Botanic Garden of the University of California, Berkeley, donated 71 mature plants which were moved from California to Seattle in late March, 1956 and planted directly into the gaps created by the freeze. Other camellias have been added since then, and although no sustained effort has been made to include the newest and latest cultivars, a few recent introductions have been acquired as space and resources permit.

In 1981, the Arboretum received a grant from the Arboretum Foundation for the renovation of the entire collection. This included a thorough pruning, moving certain large specimen plants

which were overgrowing their space and disposing of duplicates and plants of questionable merit. In addition, the area has been expanded somewhat with the inclusion of six new planting beds. Part of this area also doubles in brass for the Styracaceae collection and a number of *Styrax, Halesia,* and other related genera are found growing with and among the camellias. Perhaps the most showy flowering trees used as camellia companion plants are magnolias. These are largely early flowering asiatic species or hybrids now reaching mature size and blooming freely. Amongst the most spectacular are *M. campbellii* and *cambellii* var. *mollicomata, M. sargentiana* 'Robusta' and *M. sprengeri* 'Diva.' Their flowering season normally coincides with the earliest of the camellias to make a spectacular display.

The camellia collection now contains about 275 taxa; 201 are *C. japonica* cultivars including subsp. *rusticana;* 39 are *C. sasanqua,* 13 *C.* X *williamsii,* 18 miscellaneous hybrids, 6 *C. saluenensis* cultivars, and 8 other species. Of the last, *C. maliflora, C. honkongensis, C. granthamiana,* and several cultivars of *C. sinensis* and *C. reticulata* are kept in a cool greenhouse; the remainder are planted in the Arboretum.

An attempt has been made in recent years to increase the number of species and hybrids. The first hybrids, a collection of X *williamsii,* were imported from Great Britain in 1952 with others following in 1954. Many of these early introductions have now become very large specimens, some nearly twenty feet tall. Other hybrids including those with *C. reticulata* such as 'Howard Asper', 'Innovation' and 'Royalty' were added more recently. Most of these have been planted together with *C. reticulata* so the public may compare their performance. Another group includes many of our species. Here the wild form of *C. japonica* grows along side its subspecies *rusticana, C. sinensis,* and several cultivars of *C. saluenensis. Camellia reticulata* and *C. pittardii* var. *yunnanense* are also growing here under the protection of several large western red cedars. The former, a selected form with bright cerise flowers appearing in late February and early March we received from a garden in coastal Oregon and has proved remarkably hardy. The *C. pittardii* variety, now

Camellia japonica *'Nina Avery.'* *photo: Joy Spurr*

Camellia japonica *'Lady Vansittart.'* *photo: Renee Freier*

about thirty feet tall, came from Dr. W. Lammerts, Rancho Santa Ana Botanic Garden.

There are several plantings within the camellia area devoted to *C. sasanqua* varieties although there is a small group in the Winter Garden, a place for displaying winter flowering plants. A number of these came from Japanese nurseries in the early 1940s. While the sasanqua camellias grow very well in the Arboretum, it must be admitted that they flower more freely if they are planted against a wall rather than as they are in open beds.

The backbone of the collection is, of course, the many cultivars of *C. japonica.* Very few are of Pacific Northwest origin, since gardeners in this part of the world have never been as interested in them as they have in rhododendrons. 'Auburn White', (or is it 'Mrs. Bertha A. Harms'?), 'Lily Pons', and 'Willmetta' are perhaps the most successful of these local introductions, although five or six are included in the collection.

The majority of cultivars represent a mixture of American, Japanese, and European selections which for the most part were obtained from local sources. Others were received from the Botanic Garden, University of California, Berkeley in 1956 as mentioned above. A substantial number came from the National Arboretum or the U.S. Plant Introduction Station, Glenn Dale, MD.

Flowering in the collection begins in October or November with the sasanquas and continues until stopped by a hard frost. Often, as in the winter of 1982-83, they will continue until February. Several of the *reticulata* and X *williamsii* hybrids will be flowering in February as will our earliest *C. japonica.* It is not unusual for 'Daikagura' to open its red and white flecked flowers about Christmas. Most of the hybrids will be in bloom by late March. Early to mid-April is the height of the season in a normal year, and by mid-May, only a few of the latest will still show color.

The camellias receive no special attention from our grounds maintenance staff, and once established seem to thrive with only minimal care. They receive a fertilization perhaps once every three years, then with the same formulation as is used on our rhododendrons. They are

mulched with chips, shavings, or leafmold every other year both to improve the soil and to keep weeds under control. There is no insect control program since there is seldom any need for it. Scale may occasionally occur, but usually is not a problem. Petal blight on the other hand is, but so far has not been so severe as to require control measures.

Summer irrigation is a must and an automatic watering system was installed in the camellia collection several years ago. It is a series of sprinklers mounted on posts above the shrubs and so far has worked well. It is turned on in early May and continues until the fall rains begin in October.

What is the future for the Arboretum's camellia collection? We can safely predict that it will continue much as it has in the past. This is rhododendron country and seems likely to remain so. Nearly every garden in Seattle has at least one or more rhododendrons while perhaps only one in five grow camellias. Part of the function of the collection is to display those camellias which do well in local gardens and to this end, we plan to continue the modest introduction and trials already begun, neither increasing or decreasing the total size of the collection. In this way, we can help to acquaint the gardening public with both the older reliable cultivars and with some of the best of the newer ones.

Camellia x williamsii *'J.C. Williams.'* *photo: J.A. Witt*

Life Members of The Arboretum Foundation

We wish to express our sincere appreciation to the following members who have increased their commitment to the Arboretum Foundation to that of Life Members:

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Gardens Rich in Gillyvors

CLAYTON ANTIEAU

Clayton Antieau is a graduate student of landscape plants at the Center for Urban Horticulture.

Although the continental Renaissance had begun about 1400 A.D. and was well-manifested by the sixteenth century, rebirth in England was latecoming. Yet, it was during this period — a time known as the Elizabethan Age (1533-1603) — that an avid student of horticulture reached great literary summits. This man was William Shakespeare, a virtuoso of written and spoken language and a dedicated observer of nature. His plays and sonnets hold a special interest for the gardener and naturalist. He uses plants expressively as elements of description, metaphor, and simile throughout his works. Diverse horticultural practices and references to nearly two hundred different plants are scattered throughout his literary endeavors.

One of the Bard's horticulturally richest scenes is in *The Winter's Tale,* a tragicomedy set in Bohemia. In Act IV, Scene iv, lines 55-165, Shakespeare writes about horticultural implements, plant breeding, propagation techniques, and the uses of many plants. This passage offers helpful clues for imagining what horticulture was like during the English Renaissance. It also reveals much about the Elizabethan attitude toward plants. Flowers emerge as an essential part of daily life, used for symbolism and for pleasure: cultured in "rustic gardens" (84), for welcoming guests into the home (73), and during mourning (129). Violets are praised as "sweeter than the lids of Juno's eyes/or Cytherea's breath" (141-142). Each kind of flower was associated with affection, friendship, youth or age. Rosemary was to remembrance as rue was to grace (87).

Flowers that are cultivated and cherished today are included in this scene. The carnation (95) and marigold (calendula, or pot-marigold, 105) are mentioned, as are daffodils, primroses, oxlips, the crown imperial, the flow'r-de-luce (iris) and lilies (118-127). These plants and others were being carefully cultured during Shakespeare's lifetime.

Additional evidence of horticultural diversity and technology during the English Renaissance is found in Shakespeare's reference to vegetative propagation; "I'll not put/The dibble in earth to set one slip of them" (117-118). The slip, or cutting, was undoubtedly used for propagating plants in the garden, and the dibble, a tool still

practical today, was used to make holes in the earth for transplanting or seeding.

Shakespeare also refers to the art of grafting:

"You see, sweet maid, we marry
A gentler scion to the wildest stock,
And make conceive a bark of baser kind
By bud of nobler race." (108-113)

He praises the union of scion and stock in making a better tree, perhaps realizing the importance this phenomenon holds for mankind.

Finally, the poet provides yet another opportunity for the reader to understand the extent of garden knowledge during the Elizabethan Age. In line 82 of Scene iv, streaked gillyvors are mentioned — genuine, variegated pinks — a remarkable result of past gardeners' skills in crossbreeding and selecting plants. The ability to breed and improve plants was appreciated and practiced at this time. Shakespeare goes a step further, however, and addresses the ancient conflict between art and nature. A character in the play, Perdita, refuses to grow the streaked gillyvors in her garden. She is concerned that nature is being compromised by man's attempts to improve upon nature by breeding these plants. This is a sentiment held close to the hearts of many modern-day gardeners:

" . . . the fairest flow'rs o' th' seasons
Are our carnations and streak'd gillyvors.
Which some call nature's bastards. Of that kind
Our rustic garden's barren, and I care not
To get slips of them.
. . . For I have heard it said
There is an art which in their piedness shares
With great creating Nature." (81-87)

Her companion retorts that the art of breeding or grafting is itself the creation of nature. Each viewpoint was being contemplated during Shakespeare's lifetime, and by Shakespeare himself.

The Bard of Avon provides his audience with treasure, a gift of history, knowledge, ideas and entertainment. His horticultural imagery can lead readers to an appreciation of Shakespeare and an understanding of horticulture in the Elizabethan Age, as well as in modern times. "Then make your gardens rich in gillyvors," (115) Shakespeare writes, eternally tempting gardeners with his wealth of information and insight.

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2 *Caryophyllus multiplex.*
The double Cloue Gillofloweer.

3 *Armeria rubra latifolia.*
Broadleafed Sweete Williams.

Honeybees as Environmental Watchdogs

B.J.D. MEEUSE

In a previous article titled "Plants as Air-Pollution Indicators," *Arboretum Bulletin* 40(4): 9-16, Winter 1980, we discussed the role which certain plants, especially lichens, can play as indicators of air- or soil-pollution. Their special usefulness lies in the fact that plants remain in a given environment for a long time, so that they can "absorb" and integrate all the deleterious factors that are active during a given period, even those that make themselves felt for very short and intermittent periods only. The strength of this "biological" method is also its weakness. Indeed, if the plants chosen are adversely affected by the environment, simple and direct observation can tell us so. We do find out that "something is wrong" from the nature of the symptoms which these plant guinea pigs display. We can sometimes even make educated guesses as to the identity of the "bad" environmental factor, or complex of factors, that is responsible for the damage. However, guesses are not good enough! If we want certainty, we *must* resort to a chemical or physical determination of the suspected bad factor(s). This leads to a dilemma. Unless one is a human octopus, or has expensive monitoring equipment available, one can in principle make a chemical or physical observation at one point in time and space only. This is really a truth as big as a barn, for it is self-evident that we can do the job only at one particular spot, at one particular moment. And this while everybody knows that certain environmental factors, such as the concentration of carbon monoxide and sulfur dioxide in the air, change from day to day! Biologists are also painfully aware of the fact that a given environment can be very "patchy" in that it may, for instance, show striking differences in the concentration of heavy metals from one spot to the next. If we restrict ourselves to just one, or at best a few, determinations, it is more than likely that we will overlook a factor that happens to be very local or of very short duration. It appears that the only way out of the dilemma is to carry out a very large number of chemical or physical determinations over a large area and over a fairly extended period. But one can immediately see that the cost of such an ambitious undertaking may well be prohibitive. So, what is a biologist to do?

Fortunately, there are instances where one can combine the "biological" and the "chemical"

A honeybee visiting a Cistus *flower.* *photo: Tom Boyden*

approach. In solving our dilemma, bees can be made our great allies! Foraging honeybees have an impressive action-radius, so that they can rapidly sample areas ranging up to a few kilometers in diameter. Chemical analysis of the nectar and pollen the bees bring back to the hive can quickly reveal the presence of pollutants. In 1983, the British entomologist J.B. Free and his associates have shown that this method really works. Investigating the pollen brought back in regions known for high levels of heavy metals, they found that the concentrations of lead, copper, zinc and manganese were several times higher than the concentrations observed in pollen from clean areas. Obviously, the heavy metals that were contaminating the environment had found their way, through the living plant, to the pollen collected by the bees. Humans can easily obtain such pollen by keeping a "pollen-trap" in front of the hive for a few hours. (This, by the way, is also the method used for collecting the pollen sold in health-food stores). No real harm is inflicted on individual honeybees or on the population in the hive. A large geographical area can be supervised by periodically analyzing the pollen brought back to a number of individual hives spread out over the area. Deleterious contaminants of the pollen can be identified quickly and accurately by chemical means, and preventive measures against the pollutants can then be taken.

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Sumi painting by Reni Moriarty.

An Introduction to Bamboo
Part I

DAPHNE LEWIS

Daphne Lewis is a landscape designer specializing in small-scale design with special interests in edible landscapes, permaculture and appropriate technology. She is an active member of the Northwest Chapter of the American Bamboo Society.

This article is the first of a two part introduction to bamboo. The second article will deal with bamboos that are hardy in the Pacific Northwest.

Even though I know that people become fascinated by one particular genus or family of plants, I am surprised that I have become fascinated by the sub-family of grasses called Bambusoides and that I am active in a bamboo society. Why the fascination? Bamboo is edible and yet is not a crop which needs to be replanted each year. It is ornamental and it is perhaps the most useful plant known to man. It is basic to the culture of Asia.

What is bamboo?

Bamboo is a woody grass. Like all grasses, it is a monocot and has a single seed leaf. Its parallel-veined leaves have a sheath, a ligule and a blade. It has wind-pollinated flowers and jointed stems. The parts of bamboo have the same nomenclature as other grasses. The upright stem is called a culm. The joints in the culm are called nodes and the hollow part of the culm, in between the nodes, is called the internode. The horizontal stem is called a rhizome and runs through the upper layer of soil. Like grass, bamboo has either a running or a clumping habit. Running bamboos are found in temperate climates and are hardy in Seattle, clumping bamboos are tropical and are not hardy in this area. Mountain bamboos are clumping bamboos from the tropics which have adapted to high altitudes. These delicate clumpers are hardy in the Pacific Northwest.

Bamboo has five obvious characteristics which distinguish it from other grasses: (1) an evergreen appearance; (2) woody culms; (3) foliage leaves with petioles; (4) the attainment of full height in two months of growth; and (5) long intervals between flowering.

Evergreen Appearance

The foliage leaves of a bamboo live one year. They remain on the twigs all winter until they are pushed off in spring by the new leaves. Oriental artists comment frequently on the

Sasa japonica (Arundinaria). *photo: Renee Freier*

beauty of the bamboo plant when its green leaves and culms contrast with the white of winter snow.

Woody Culms

The culms of the bamboo are so unique that people "know" bamboo. They do not mistake it for corn, sugar cane, or any other grass. The woody culm is strong and light and lives approximately ten years. Typically the young culm is green. As it ages it may sun bleach to yellow; in any case the older culm loses its bright green color. The culm reaches its full hardness in three years and can be harvested for construction purposes at that time.

Foliage Leaves with Petioles

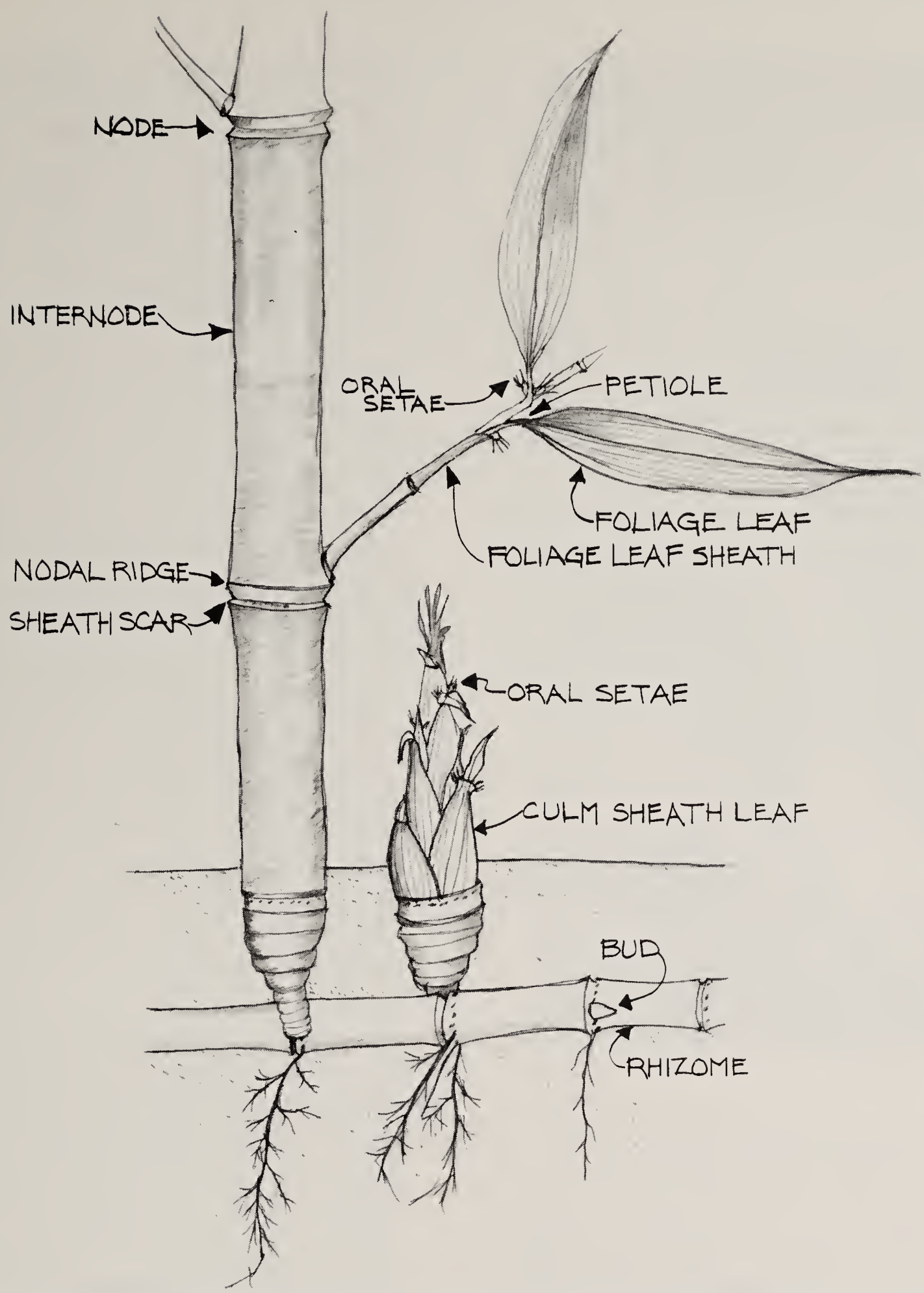
The leaves of all grasses have three parts; the sheath, the ligule, and the blade. The sheath is that part which is wrapped around the culm. The ligule, which is generally very small, extends out of the sheath and is pressed tightly against the culm. The blade is the obvious part of the leaf that is free from the culm. Unlike other grasses bamboo has two kinds of leaves; the culm sheath leaf and the foliage leaf. The culm sheath leaf is like the typical grass leaf except that its sheath is much larger than its blade; it photosynthesizes little, if at all, and dies shortly after the culm has reached its final height. The foliage leaf differs from the sheath leaf in that its sheath is wrapped around a twig and its petiole holds the blade out from the twig so that it looks like a leaf of a dicot.

Full Height in Two Months

When a new culm or "shoot" of bamboo first breaks out of the ground, it already has its mature diameter. Within two months it will shoot to its full height. A few of the tropical giant timber bamboos may take three months to reach the full height of 70 to 100 feet. The culms of the giant timber bamboos have been measured to grow almost four feet in a day. The energy in a bamboo grove in spring is palpable — you can almost see the shoots growing.

Long Intervals Between Flowering

Most bamboos do not bloom every year, although some tend to have a culm or two in bloom much of the time. Most bamboos bloom at long intervals, such as 60 to 120 years apart



The bamboo plant has two kinds of stem. The vertical one is called a culm and the horizontal one is called a rhizome. Both stems have the same structure of hollow internodes separated by nodes. Buds occur alternately at the nodes. *author's drawing*

(some even 150 years), and some have never been known to bloom. One of the bamboos most familiar to Pacific Northwesterners, black bamboo *(Phyllostachys nigra)*, bloomed last in 1907. The interval between blooming periods is not predictable — it depends on the genus, species, and in some unknown way, on environmental factors. The big spectacular bamboos tend to die after they bloom. Many gardens in Seattle had good stands of Japanese timber bamboo *(Phyllostachys bambusoides)*, which bloomed in the 1970's — within three or four years the groves were dead. The timber bamboo, called vivax *(P. vivax)*, is blooming and there are dead groves scattered around the city. However, there is a grove in Vancouver, Washington that bloomed some years ago and is coming back. The culms, which were 3 inches in diameter before blooming are now 1½ inches.

There are some frustrating (or amusing) results of this infrequent flowering habit: (1) difficult taxonomy, ie., how do you know what species a plant is if you have no sexual parts?; (2) cultivated varieties arise from mutations in a clone and not from seed and so can be lost when the plant flowers; and (3) no hybrids.

Phyllostachys nigra

Commonly Asked Bamboo Questions

In April of 1984 a "Spring Garden Show" was held in Puyallup. The Pacific Northwest Chapter of the American Bamboo Society had a booth there. Here are the three questions most often asked by people attending the show.

How Do You Kill It?

Usually when people asked this question they were confusing summer bamboo *(Polygonum cuspidatum)*, alias Japanese knotweed, with bamboo. *Polygonum* is more invasive and difficult to kill than bamboo. Like all other plants (unless dormant or parasitic), both *Polygonum* and bamboo need to photosynthesize in order to live. The way to kill them is never to allow any foliage. Some folks deleaf a plant mechanically, others chemically. If you elect to kill bamboo mechanically, cut off the old culms and save them to give or sell to friends, or take them to a zoo for primate "browse." Knock the new shoots (all of them) over with your foot as they come up. If you decide to kill bamboo chemically, remember it is a grass and responds to poisons designed to kill grasses. Another way to get rid of bamboo is to call a zoo or the Bamboo Society. Usually a person can be found who will dig the bamboo or at least cut the culms for his or her own use.

How Do You Control Bamboo?

Bamboo rhizomes run horizontally through the ground in the upper foot of soil. A rhizome barrier such as fiberglass, flashing or concrete that is two inches deep is considered to be sufficient to contain bamboo. The barrier, which deflects the soft growing tip of the rhizome, should be placed vertically or tilted slightly away from the plant so that the rhizome growth will deflect upwards where it can be seen and cut off. Bamboo can also be grown in pots.

There are points of view that bamboo's spreading is a problem and others that it is a benefit. At the "Spring Garden Show" one couple told us that they had planted some timber bamboo in their side yard and had asked their neighbors if they wished them to control the bamboo so that it would not cross the fence. The neighbors were from Vietnam and misunderstood the question — they assured the couple that, "no, they would not eat the bamboo."

Bamboo prefers loose, moist, rich soil and will tend to move from compacted soil such as under a driveway toward the good soil of a prepared and watered bed. In Japan, if a farmer covets his neighbor's Moso bamboo *(Phyllostachys pubescens)* he will plow and manure a strip ten feet wide along the fence-line and sure enough the bamboo will come over.

What Kind of Bamboo Do the Giant Panda Eat?

The giant pandas eat several kinds of bamboo depending on the season of the year, their altitude above sea level, in what part of their range they are, and the stage of growth of the bamboo. The most common bamboo in their diet is umbrella bamboo *(Thamnocalamus spathaceus)*. Pandas in zoos are fed other genera such as *Pseudosasa* and *Phyllostachys*. The genus *Thamnocalamus* includes alpine bamboos, bamboos from Eastern Asia. *T. spathaceus* has a maximum height of 15 feet and a diameter of .75 inches. It is the hardiest bamboo and will survive temperatures of minus 20 degrees Fahrenheit.

In the Arboretum . . .

Our Arboretum is a living museum, not just another urban park or nature preserve. That is why, for the first time in many years, federal funds have been awarded to help renovate the 50-year-old plant "museum." The Federal Institute of Museum Services has awarded two grants to the Center for Urban Horticulture, which administers the Arboretum. One grant of $45,000 is for operations costs. This grant will be used to improve the educational and interpretive material for Arboretum users. The other is a $25,000 conservation grant for renovating the plant collection by removing 200 "weed" trees and restoring the plantings beneath them.

Most of these trees were already on the land in 1936 when the Olmsted Brothers laid out the Arboretum. Now these trees have outgrown the original design, blocking vistas and putting the plan out of balance. Some trees that were originally moderate in size are now very large and collections planted underneath them are suffering. Other trees, such as big leaf maples, are dying or already dead as part of their regular life cycle.

The overgrowth has shut out light to many rhododendrons and other flowering shrub collections, diminishing the bloom and distorting the shape of the shrubs. Poor air circulation beneath these trees makes many plants vulnerable to disease in our moist climate. The "weed" trees also rob the other plants of needed nutrients and water.

Like an art museum conserving and restoring valuable paintings, the Arboretum is using the grant to preserve and restore its collection of woody plants, which includes more than 5,200 taxa of trees, shrubs and vines. For example, the Arboretum's holly collection, once one of the finest in the nation, has declined in part because of the overgrowth of trees. This work will open it up a bit and allow us to come in with new varieties developed over the past 20 years.

Removing the trees will probably take four months and is delicate work. Often branches must be cut off and lowered by rope, and the trunk removed in sections. Depending on the size and location it can take three or four days to remove one tree. Plants beneath the trees are vulnerable to damage and in some cases will be completely dug up, transferred to a greenhouse, and then replanted after the trees are removed.

Tom Griffin

Yes, Jim,
There is a Mountain Beaver!

NAN BALLARD

Nan Ballard is a member of the Arboretum Bulletin Editorial Board.

Lewis and Clark first heard of that rare and curious animal, now called the mountain beaver, during their expedition to the Pacific Northwest in the early 1800's. Professor Jim Clark, a transplanted New Jerseyite, first heard of the mountain beaver during an *Arboretum Bulletin* Editorial Board meeting. He didn't believe us. He thought that Joe Witt and the other Editorial Board members were taking him on a "snipe hunt" or "pulling his leg." Professor Clark insisted that no such creature could possibly exist.

Almost anyone who has gardened in or near a wooded, moist area in this part of the country can add to the lore of the mountain beaver. Yet, small wonder that Jim doubted us; writers of some of the reference books about American mammals seem not to be aware of its existence. At one time the mountain beaver's range extended through the Great Basin to North Dakota. Today it is endemic exclusively to a slim territory stretching along the Pacific Coast to the Cascades, and other coastal ranges, from the lower Fraser River in British Columbia to San Francisco Bay.

Like our Douglas fir, which is not a fir, our western red cedar which is not a true cedar, and innumerable other anomalies of nomenclature, the mountain beaver is not a beaver. Furthermore it is found less frequently in the mountains than in the tangled, second growth woods of lower elevations in which it makes its runs and tunnels. As man has invaded mountain beaver territory, claiming and clearing the land and destroying the woodland understory, the mountain beaver has adapted its vegetarian diet to what people provide in truck gardens and landscaped yards. There is no question but that the mountain beaver is an unwelcome harvester, a pest, a nuisance, but just who is trespassing on whose territory?

The mountain beaver is the sole member of the *Aplodontia* genus. Many consider it to be the ancestor of the entire rodent family. There apparently is but one species *(Aplodontia rufa)* with nine or so subspecies which seem to differ little except geographically.

Theo. H. Scheffer of Puyallup, in his unique and extensive study of the mountain beaver in the Pacific Northwest (USDA, 1929; *Farmer's*

A young mountain beaver, side view. *photo: George Pinyuh*

Bulletin #1598), describes the mountain beaver as resembling in size and general appearance a muskrat without a tail. Instead of having a beaver-like tail, it has an appendage so small that it escapes notice. Its ears are short and its lackluster little eyes do not have the snap and expression noted in rodents that live more in the open. The body is stout and compact, adults averaging a little over a foot in length and about two pounds in weight. The males are only slightly larger than the females.

The mountain beaver has powerful muscles about the head, front legs and chest, which enable it to carry large, unwieldy loads. Its legs are short and its feet are plantigrade (i.e., it walks on the whole sole of the foot as do man and bear). As a result, the mountain beaver appears to creep over the ground but moves fairly rapidly. The front feet are equipped with long, strong digging claws. Scheffer describes its paws as having "on the heel of the palm two elongated processes which, with the thumb oppose four fingers and thus assist in grasping."

Mating seems to be confined to a brief period in late February and March, with a gestation period of about thirty days. The females are slow to breed (second year) and have litters of two to three. The young do not reach full adulthood for more than a year, although they seem to leave the nest within three months to develop their own territories. Scheffer says the mountain beaver seems to lack community spirit, resenting encroachment upon its personal space, but living together in close quarters and using some common runs from a sense of personal need rather than the desire for company. The mountain beaver has few enemies (other than man), which might be because man has somewhat depleted the numbers of natural enemies such as the bobcat, the eagle, and others. There is also the fact that the mountain beaver is nocturnal and is seldom seen crossing open spaces. While not considered aquatic, mountain beavers are known to paddle through small streams to reach a source of food and they cope with frequently flooded tunnels.

Names for the Mountain Beaver

Most of the meager information in natural history references include the native American name "sewellel" (the name by which Lewis and Clark knew them) which was also the name for the capes and blankets the Indians made from the mountain beaver pelts. Hudson Bay Com-

A young mountain beaver, front view. *photo: George Pinyuh*

pany, however, apparently did not consider these pelts to be of sufficient quality to be included in the fur trade. Thom Hess in his Dictionary of Puget Salish, suggested another native word, "swk'l," for the mountain beaver. This word is said to describe the sound the animal makes as it works its way above ground through the forest understory of twigs and litter. Scheffer reports that the Nisqually Indians called it "sh'auch" to designate the character of this creature's movements. In the Olympic Mountains, the Indians called it "chehalis." In Oregon it has been called a "mountain boomer" although it does not "boom"; it has been called a "whistler" although no sound it makes could be described as a whistle. One author suggests that the early settlers might have thought they were hearing the mountain beaver when the grouse "boomed" and the marmot "whistled." Actually, the mountain beaver is the strong silent type —it has no regular calls but can be stridently vocal when enraged. Although its vision is poor, its hearing is excellent and there is evidence that its sense of smell is highly developed.

Care and Feeding of the Mountain Beaver

To those of us who live in the wooded reaches of the western half of the Pacific Northwest, our furry little neighbor becomes a great nuisance by building its tunnels just under the surface of the ground. Among the young horseback riders in my neighborhood, I am considered the mean old witch of Funnybrook Farm because I will not let them ride through the wilderness of my back acreage. It is not because I zealously guard my fences, nor because of the bears that occasionally drift through to feed at night on the apples in the orchard. Rather I fear for their young limbs and those of their steeds. My woods are honeycombed with mountain beaver runs. Even when walking with extreme caution through the underbrush, I sometimes find myself up to a kneecap in a loosely covered hole.

The mountain beaver is a vegetarian and has been accused of decimating a small garden practically overnight. It dines on leaves, bark, and roots and has pruning practices which leave much to be desired, artistically or horticulturally. Mountain beavers, while not considered tree climbers, do scramble up a small tree or bush, often cutting off the lower branches, leaving stubs near the trunk. They then climb back down head first, carrying their loot in their strong jaws. The mountain beaver makes a smooth cut, with a single sloping surface; usually they do not try to cut stems exceeding about an inch in thickness. In addition, they frequently collect grasses, reeds, or smaller twigs, which they neatly bundle with all of the cut ends facing the same direction. These bundles can be found near an entry hole, left to be cured in the sun before being put into the tunnel for storage.

I shall never forget the evening my husband, Page, came in from his usual tour of the garden. I had just completed my first course in gardening practices and had spent the day applying my new-found techniques. "I see," said Page, "that you did a little pruning today." "Oh, yes, isn't it wonderful? I got so much done," "Ahh, but did you have to prune the life out of that lovely rhododendron under the old apple tree?" I tried to convince him that I had not touched a single rhododendron and went with him to see the

damage. "Not I, a mountain beaver must have done it." "No mountain beaver," said Page, "could have climbed that slender a trunk or cut branches that smoothly without using your new ladder and newly honed pruners." I led the way to the nearest mountain beaver hole at the edge of the grove and there, sticking into the run, were all those precious rhododendron prunings. I blessed that mountain beaver for not hiding the evidence before I could prove my innocence to Page.

Almost anything the farmer or gardener plants, if within range of a tunnel exit, may tickle the mountain beaver's fancy. I sometimes think I can hear them calling, "Hey guys, come see what I just found. We'll eat gourmet tonight." The usual rabbit fence around a kitchen garden does little to impede a mountain beaver. The little animal merely extends its tunnel a few more feet and comes up in the middle of the garden to begin the harvest.

Coping with Your Mountain Beaver

And how do you rid yourself of these critters? Someone less faint of heart than I must advise you on this score. I know people who go after them with sharp shovels, deadly poisons, steel traps. This I cannot do. I find it difficult to use even live traps (whereby they are caught unharmed and transported to freedom in another area where they become someone else's problem). As with the deer who also prune, not necessarily how and where I like, I try to find other means of coping. Sometimes I can erect little temporary fences of hardware cloth or chicken wire around a particularly choice plant. Sometimes I can move a proven delicacy out of the range of a mountain beaver tunnel. Sometimes, I admit, if I procrastinate long enough the problem no longer exists; either the plant has grown too large to be nibbled or it has disappeared into oblivion with all those other plants I have lost to the vagaries of nature.

The mountain beaver track is not apt to be confused with that of any other animal. The track imprint in mud shows its distinctively long and slender toes. It is a small, slow-moving animal, consequently leaving a trail of closely spaced tracks. Tracks and caption from Animal Tracks of the Pacific Northwest by Karen Pandell and Chris Stall, courtesy of The Mountaineers.

A New Beginning

LESLIE NORTON

Leslie Norton has been a Seattle-area gardener for some years. She works in the Camp Fire nature program and leads eco-walks in her own woods. She is a frequent contributor to the Arboretum Bulletin.

The window over my sink frames a view of lawn, trees, and a honey-suckle-covered old shed; in the distance, over the shed and beyond the adjoining nursery, several tall, dark firs and cedars are silhouetted against the sky. One of these, a fir, has come to have a special meaning to me. Hardly a day goes by but that it seems to send me its personal message.

It was several years ago that this message first entered my conscious mind — the tree had lost its top, and where was once the crown, was then a bowl-shaped space open to the sky. Starting in the center of this space was a short, straight new shoot. How thrilled I was to see this evidence of the tree's effort to repair the damage it had sustained.

The next year, the straight shoot was taller and a layer of side branches had started out from it. In the year following, a second layer of side branches grew above the first, and the leading shoot continued to grow taller. The tree seemed to be telling me, "I'm going forward. It's never too late to make a new beginning. In a few years no one will know that I lost my top."

Today the tree is again whole and presents a beautiful outline against the sky. It has been an inspiration to me. I know that even now, should damage come to the new growth, the power that is at work in it would continue and a new effort would be made to restore the tree to the form that nature intends for the species. I know that this same power works through all of life, and is working in me toward health, repair and growth.

Book Reviews

PLANT HUNTING IN NEPAL, by Roy Lancaster, published by Croom-Helm, London, 1981. 194 pages. Price $19.95

Roy Lancaster wrote *Plant Hunting in Nepal* ten years after he had visited the northeast corner of that country. The seed he brought home must be fully grown plants with children by now. I wish he had written the book sooner so that many of us who trekked in the 1970s could have benefited from the plant index of over 200 species. In addition he lists 417 plant numbers of seed collected in the three months that he, Ben Beer and Dave Morris, tramped from the foothills to heights of over 16,000 feet.

It is a little tiresome to hear the repetitive phrase "too tender for English gardens" when he discusses elevations of less than 10,000 feet. If this is a book written for temperate zone gardeners, most of these tantalizing paragraphs could well have been eliminated. One senses the frustration he felt at seeing so many beautiful plants which would collapse at the first touch of cold weather in Britain.

Mr. Lancaster includes detailed descriptions of many trees because of his specialized work with Hillier's nursery. His descriptions of small shrubs, annuals and perennials also offer the reader a well-blended pot-pourri of plants many of us would enjoy in our small gardens.

The book will appeal to the armchair stay-at-home gardener as well as those of us amateur plant hunters who saw many of the same plants while trekking over some of the same hills or nearby mountains of India and Sikkim. Rock gardeners will enjoy the discoveries found in screes.

Of particular interest is the chapter "Some Thoughts in Plant Hunting" which contains warnings on collecting. More could have been said on the use of rhododendrons as fuel to keep the sahibs warm. He does not mince words about leeches, rain and the early snows. If you are planning an expedition read and be warned, but don't let it stop you.

Paul Chester's pen and ink sketches are well done and accurate. But the maps, especially the detailed one, are not helpful. There are too many dots indicating elevations which interfere with place names when one tries to follow the trek. We are offered, however, an added bonus of two sets of beautiful color pictures with elevation markings.

This soft cover book includes a good bibliography of readily available books, an appendix with collection numbers, a plant index of all plants seen on the trip, and a glossary of plant terms — even a list of generic names with their English equivalents.

Jeanne Gardiner

CAMELLIAS, by Professor Chang Hung Ta and Dr. Bruce Bartholomew. Timber Press, Portland, Oregon; in cooperation with the American Camellia Society, Fort Valley, Georgia. 220 pages of text, including 74 line drawings and 3 maps. Hardcover. Price $29.95

Dr. Chang has devoted his life to locating and identifying camellias in the interior of China. In 1981 he published, in Chinese, a detailed description of most of the known species of camellias, including the 92 new ones that he had discovered as the result of his research. He has essentially doubled the number of species that are recognized within the genus. Dr. Bruce Bartholomew is also an authority, and in the book *Camellias,* he has revised Dr. Chang's manual and translated it into English.

Camellias is a scholarly work of outstanding quality. The keys are detailed, and the botanical descriptions are comprehensive. The full page line drawings illustrate, in particular, the new species of camellia that Dr. Chang discovered. The introduction to the book includes a brief history of camellia cultivation in the western world, the horticultural potential of the species, the geographical distribution of camellias and their economic uses.

Camellias is a classic reference that provides valuable details for the expert. It contains important information about the qualities of the new species and this will help growers to enhance the cold hardiness as well as the color and form of camellias.

Dr. Chang Hung Ta is Professor of Botany and Head of the Department of Biology at Sunyatsen University in Canton, China. He is a member of the South China Institute of Botany and Yunnan Tropical Institute of Botany Academia Sinica. Dr. Bruce Bartholomew is Director of the Herbarium of the California Academy of Science. He has taken part in several plant collecting expeditions in China, some with Professor Chang.

Doris L. Taggart

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Pheasant and Crow

The huge numbers, the varieties and the behavior of birds has been a surprise and a source of interest for those of us who have offices in the new and yet unlandscaped, Center for Urban Horticulture. Often a meeting will be interrupted momentarily when a large flight of geese crosses to the south of us, honking in full-throated unison. At other times these magnificent creatures stand in groups of a dozen to fifty alternately grazing and murmuring among themselves. The abrupt closing of a window may startle them into flight and they rise with a great rush and rustle of their enormous wings.

Several pheasants live near my window on the lower floor. Today, while an immense congregation of crows cawed and argued with smaller flocks of other birds, I was treated to an interesting five minutes of what seemed to be a form of territoriality. A rooster stalked around pecking at the ground while a hen pheasant confronted a crow . . . and apparently won! I had always thought that these large, aggressive ebony birds — the crows — were invincible. But there he was bowing and crouching with his wings spread back, cawing loudly. The hen alternately faced him beak to beak or turned her back indifferently to collect another morsel from the ground. Eventually the crow flew away, with a loud cry, and as if it had been a signal, the flock departed. The pheasant continued to feed for a while, but now no bird is in sight, only the weeds and grasses waving in the breeze. However, the crows have not gone far. I can still hear a distant cawing from the nature preserve to the west of us.

Jan Pirzio-Biroli

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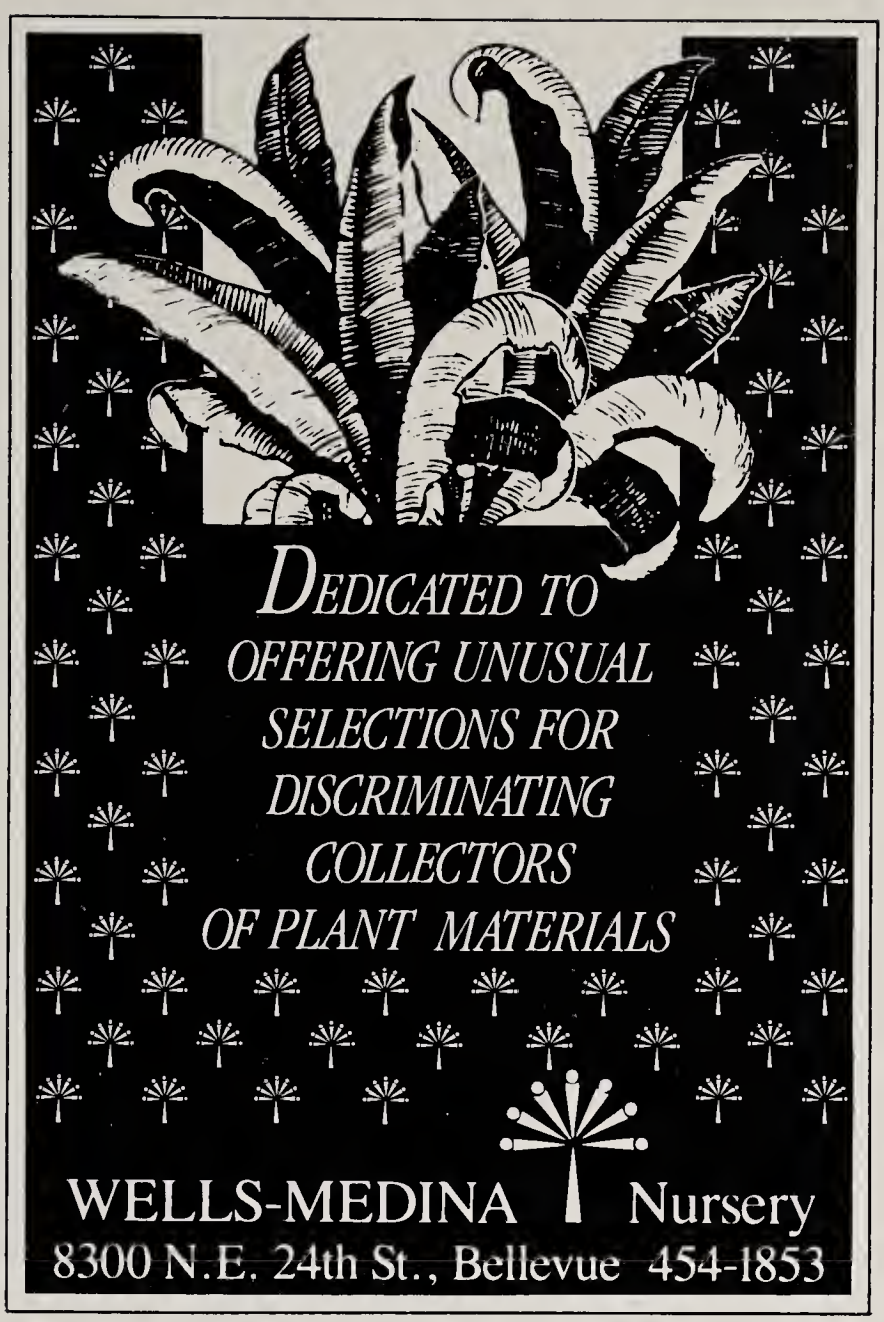
The Arboretum Bulletin is going to have a classified ads section! All of those who wish to buy or sell plants, horticultural services or books, may do so for 50¢ a word (25 word minimum). Please contact Nancy Pascoe at 325-4510/2844650, or inquire at the Arboretum Foundation, c/o University of Washington XD 10, Seattle, WA 98195.



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